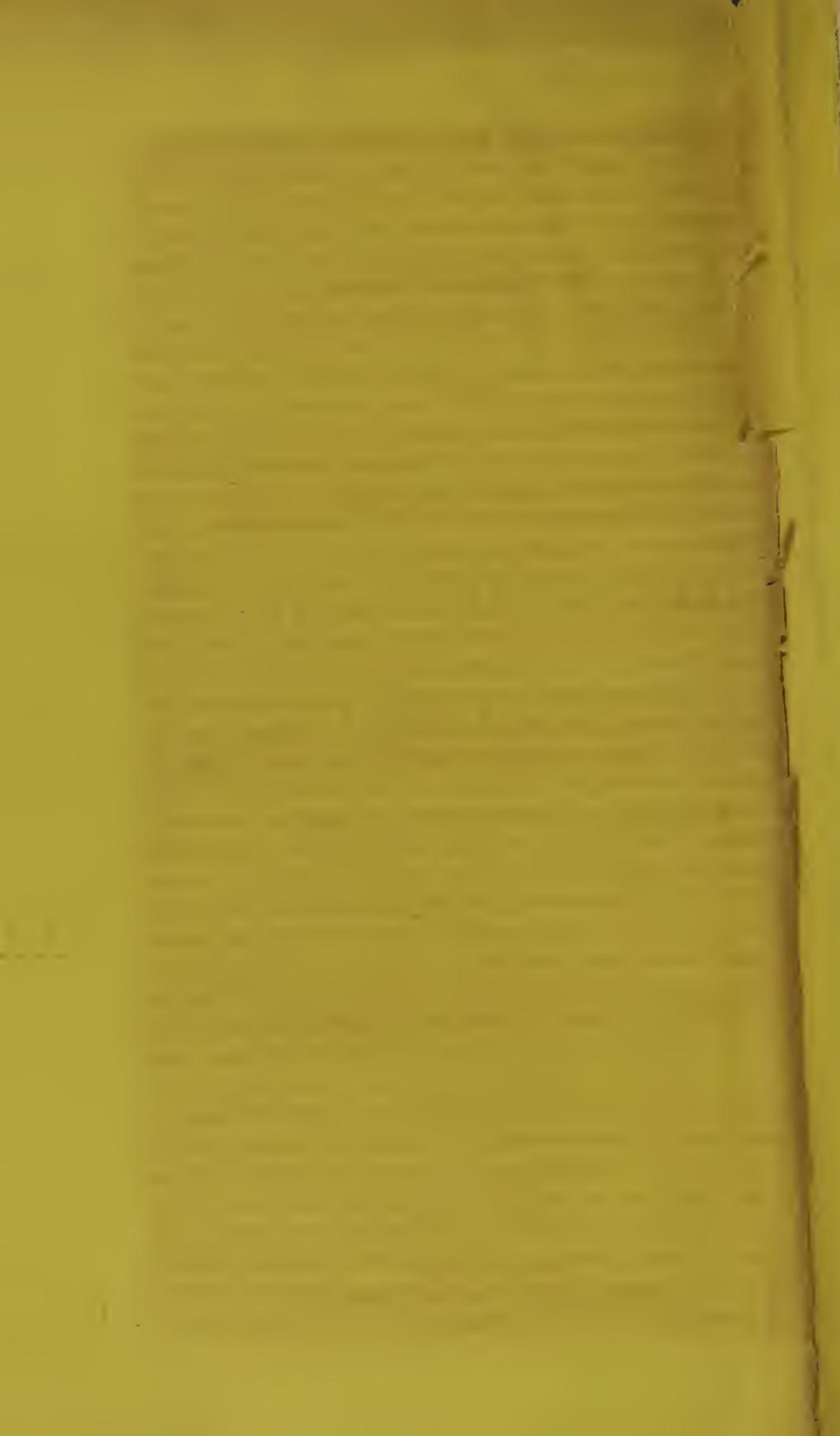


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OPERATION OF EXCISION,

WITH

RECOVERY OF USEFUL ARM.



Husted (N. C.)

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*Presented by
N. C. Husted*

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CARIES OF ELBOW JOINT.

The patient was Miss D——, aged 14 years; of leuco-phlegmatic temperament, and scrofulous diathesis. She had been afflicted for several years past with an affection of the left hip joint, of a doubtful character. In the month of April, 1860, while on a visit to the country, she fell heavily in running down a hill, and severely bruised the right elbow. At first the injury was not considered grave in character, but soon active inflammation supervened, which continued for a length of time previous to consulting any medical advice. I first visited the patient in October, 1860. At this time her general health was much impaired, and the constitutional disturbance very marked. The elbow was evidently the seat of ulcerative inflammation, and presented the following conditions: The tumefaction of the elbow was moderate, with the surrounding tissues thickened and indurated. At the posterior aspect of the joint, directly over the olecranon, the integument was in a sloughing state.

There were several sinuses also near the internal and external aspects of joint posteriorly, which were discharging a thin, glairy, ill-formed pus. Explorations with the probe detected diseased bone, and through one of the sinuses the instrument passed readily into the joint, and also encountered roughened bone. The fore-arm was flexed on the arm, nearly to a right angle, with the flexors contracted and rigid. There was not ankylosis however, although any attempt at passive motion of the joint caused excessive pain. The patient complained of great tenderness of the elbow, and complete inability to move it. I ordered the patient the following treatment, which was addressed to remove the marked cachexia; syr. ferri iodidi with oleum jecoris aselli, and locally to the joint I applied stimulating dressings. Soon after several small spicula of carious bone were discharged through recently formed sinuses, resulting from

small abscesses over the olecranon, opened with the lancet, and under the persevering administration of the above remedies, the patient soon began to improve in her general condition, and the activity of disease in the joint diminished. The tenderness and tumefaction of the elbow subsided; the suppuration rapidly decreased, not disappearing entirely, however, and movements of the joint to a very limited extent could be borne by the patient with cautious manipulations. The relations of the joint now assumed the following condition: The fore-arm was flexed on the arm to an obtuse angle, and there was partial pronation with the characteristic abnormal contour of the elbow, so marked in ulcerative affections of this joint. The contracted flexor muscles connected with the joint, were still rigid and unyielding. The integument over the posterior aspect of the elbow had cicatrized, with the exception of a sinus, which discharged slightly at intervals. Her general health having sufficiently improved, I decided to perform the operation of excision of the elbow joint, from the fact that the local lesion did not improve "*pari passu*" with the general health.

On the 28th day of September, 1861, I proceeded to perform the operation, assisted by Drs. J. R. Wood and J. K. Merritt. The patient was readily brought under the influence of sulphuric ether. I then proceeded to make the single straight incision, four and a half inches in length, over the olecranon, after the Langenbeck method, avoiding, however, the cicatrized integuments as much as possible, which located the incision nearer the external aspect of elbow than recommended by this surgeon. The next step in the operation was carefully to dissect up either edge of the incision, closely following the surfaces of the bones involved in the joint, and denuding them of the periosteum, which was carefully preserved. After entirely exposing the olecranon and the condyles of the humerus posteriorly, the joint was strongly flexed, and about an inch of the projecting olecranon was excised with a powerful bone-forceps. This allowed the more easy dissection around the joint, and I then proceeded to free the articular ends of the humerus and ulna, by dividing the ligaments of the joint. The forearm was now forcibly flexed on the arm, which protruded the free extremities of the humerus and ulna through the incision, and facilitated the completion of the dissection of these bones on their anterior aspect, and liberated the head of the radius. I was very careful to preserve

as much as possible the attachments of the biceps and brachialis anticus. It was now found that the disease embraced the articular surfaces of the humerus and the structures of the condyles nearly as far as the shaft of the bone. The articular surface of the ulna, together with the structures of the olecranon and coranoid processes, were involved also in the disease, but the head of the radius was healthy. The protruding end of the humerus was firmly held by one of the assistants, and the integument being retracted and protected by a napkin, I excised the diseased portion just above the olecranon fossa with a small amputating saw. The excised portion measured about $1\frac{1}{2}$ inches. The entire ulna was then excised, at a point immediately below the base of the coranoid process. A thin lamina of the articular surface of the radius was next sown off with a Hay's saw; and, finally, the sharp edges of the excised ends of the bones were very carefully rounded with the gnawing bone forceps. The ulnar nerve was preserved intact. The amount of the hemorrhage during the operation was very trifling. Only two ligatures were used. There was some general oozing of blood, which was arrested by the application of the liq. ferri perchloride (Dr. Squibb's) and ice. After keeping the wound open for five hours, Dr. Merritt and myself then dressed the wound, by introducing three silver wire sutures, with several silk ones intervening, and applying straps of adhesive plaster, which accurately apposed the edges of the wound, excepting the lower corner of it, this being left open to allow the exit of the subsequent discharge. The forearm was then flexed on the arm to a right angle, and both were carefully supported by pillows. Iced water dressings were applied, and an anodyne ordered if necessary. The patient had rapidly rallied from the effects of the anesthesia and operation, and after the dressing was in a very comfortable condition. The operation occupied about thirty minutes.

Sept. 29th. The patient had passed a very comfortable night; no anodyne given; moderate reaction had occurred, and the wound was in a very favorable state, the edges being well agglutinated together, the surface surrounding cool and only slightly swollen. There had been some oozing of blood from the wound during the night. The adhesive straps were divided to relieve the slight tension of the parts, and water dressings continued; low diet and sig. ammonia acetatis ordered.

Oct. 2d. Patient continues comfortable; constitutional disturbance quite moderate; the inflammation and swelling of the elbow considerable; slight oozing of a thin sanguous discharge from wound; the old cicatrix of the adjoining integument vesicated and assumed a sloughy appearance. A number of silk sutures were removed, and the strips of adhesive plaster changed; water dressings continued; rest in bed enjoined. Limb still supported on pillows.

Oct. 8th. Patient remarkably comfortable; no fever; has a good appetite; sleeps well; the heat and swelling of elbow has subsided; wound has united well, except at either corner. This discharge, which has been somewhat profuse, is now healthy and moderate in quantity. The surrounding integument has assumed a better appearance. All the wire sutures were removed to-day; the silk sutures having been removed at previous dressing. The patient is now allowed to sit up in an easy chair, with the limb supported by the sling and a flexible cushion embracing the elbow, and extending upwards to middle of arm and downwards to the hand. Ordered a generous diet, and no inflexible splint was used. From this time the patient progressed favorably. When the wound had entirely healed, passive motion of the elbow was practiced regularly. The patient also was instructed to use the hand and move the forearm. At the end of two months succeeding the operation, the patient was able to dress herself, play upon the piano, and carry an ordinary size scuttle filled with coal. At the date of this report, which is four months after the operation, the condition of the patient and the elbow, are as follows, viz: Her general health is good, weighing twenty pounds more than when the operation was performed; elbow shows no tumefaction, no sinus, in fact a healthy aspect; flexion and extension quite perfect; pronation and supination nearly so; shortening two inches.

HISTORY OF THE OPERATION OF EXCISION OF THE ELBOW JOINT.

Dr. Richard M. Hodges, of Boston, has recently published a very creditable monograph on the excision of joints, which has embraced everything authentic and positive of this now established operation up to the present time. Dr. Hodges thus prefacing his excellent memoir, which gained the Boylston Prize for 1861—"Excisions of joints have been comparatively little practiced in the United States. The personal experience of any one

American surgeon in regard to them, is therefore of a very limited character; and American medical periodicals, or systematic writings, furnish but little material calculated to throw light upon the questions connected with this class of operations. British, and to a larger extent, European medical literature offer, however, a fertile field for their study. Owing their origin to an English surgeon, they have of late years been extensively practiced throughout the United Kingdom, and a great number of the cases in which the operation has been performed, have been published with more or less detail; but, with the exception of Professor Jeffray's translation, in 1806, of the cases reported by the elder Moreau, accompanied by a reprint of the two letters of Mr. Park, and the work of Mr. Syme, printed in 1831, the English language possesses no monograph on the subject of excisions.

On this continent the interest developed by the early experimental researches of Chaussier, Heine, and Wachter has found expression in the later writings of Reid, Wagner, J. F. and O. Heyfelder, Esmarch, Paul, Schillbach, and in numerous "inaugural dissertations." From these and other sources the following pages have been prepared. The history of the operation, as stated in Dr. Hodge's paper, dates back to 1758 or '59. The following are verbatim extracts from his pages. The case of Mr. Wainman, of Shripton, England, in which he sawed off the lower end of the humerus, just above the olecranon fossa, in a case of compound dislocation, is famous in the history of excisions for its very early date. The patient lived, and the limb was as flexible "as if nothing had ever been amiss." Mr. Justamond, of London, in 1775, had excised the olecranon and two inches of the ulna for disease, and that Mr. Tyre, of Gloucester, had cut off two and a half inches of the lower end of the humerus after a compound dislocation. These partial excisions are the earliest ones which were practiced upon the elbow joint." "The elder Moreau claims to have submitted to the French Academy, in 1782, (the same year in which Park suggested it,) a proposition to excise this joint. He did not operate, however, until 1794, when he performed the first complete excision of the elbow of which any mention is made. In June, 1797, the operation was performed by his son; Roux, who subsequently became one of its strongest advocates, operated for the first time in 1819. In 1817 or 1818, the elbow was completely excised for the first time for disease in England, by Mr. Josiah Stansfield, of Leeds, and in

1819 the operation was a recognized one in the infirmary of that town, having been performed by two others of its surgeons, Messrs. Chorley and Hey.

In February, 1823, the elbow was excised in Dublin, by Sir (then Mr.) Philip Crampton, and in 1828, by Mr. James Syme, in Edinborough. The latter was so pleased with his success, that he declared that "carious joints might be cut into with the same impunity as ordinary abscesses, and cut out with no more danger than what attends amputation, or rather not so much, since the balance of action will be less disturbed, *cæteris paribus*, where the limb is allowed to remain." In 1831, this distinguished surgeon published a memoir on the "Excision of diseased joints," containing the records of seventeen cases of elbow-excisions—fourteen of which were his own. From this period onwards the annals of surgery furnish abundant examples, the gentleman just named having himself, in 1855, operated "more than one hundred times." In the United States, the elbow was first excised by Dr. John C. Warren, of Boston, October 16, 1834. The case was communicated verbally to Velpeau, who alludes to it in his *Medicine Operatoire*, but was never otherwise published. June 5, 1835, the operation was repeated by the late Dr. Thomas Harris, of the United States Navy; afterwards by Dr. Buck, of New York, in 1841, and by Dr. Pancoast, of Philadelphia, in 1842. It is mentioned, also, by both Jæger and Tobold, that a German, named Gröcke, in 1793, performed a partial excision of the elbow for a gun shot wound; the patient, a soldier, recovering at the end of five months with an ankylosed joint. But it was not till the Schleswig-Holstein war of 1848–1851, that this excision was really introduced and popularized in military practice, chiefly, as is generally admitted, through the exertions of B. Langenbeck, of Berlin, and L. Stromeyer, of Erlangen, Surgeons-in-Chief of the above named campaign.

Dr. Hodges has concluded his history of the operation. "Excision of the elbow joint, has been performed for injuries, for disease, and for ankylosis, this being one of the two joints in the body to which, for the last named cause, the operation has been considered applicable." He then proceeds to consider these three causes or conditions to which the operation is applicable. "The elbow is the frequent seat of compound fracture and dislocation from various causes, and in battle, its exposed position in both loading and firing, makes it constantly liable to gunshot in-

juries. For such accidents, met with in civil practice, as from their extent or severity, require excision of the elbow, the operation has been performed with much success; the position of the patient afterwards, and the general character of the injuries, as compared with those occurring in military practice, simplifying considerably the choice between it and amputation." "It may be a question whether the operation is as properly applicable to compound dislocations, uncomplicated with fracture, as to compound and comminuted fractures. This point is not brought out by the cases above referred to, and I am not in possession of facts to illustrate it. The opinions of Dr. Hamilton, (p. 5) and of Mr. Hutchinson, are, however, strongly in favor of it, and the error, it seems to me, is liable to be rather on the side of reduction than on that of the operation." "The greater extent to which gunshot wounds are apt, as a rule, to involve the soft parts with the large vessels and nerves, or to splinter the bones, to say nothing of the unpropitious conditions for subsequent cure in which the patient is placed by the exigencies of a campaign, must often render the choice of operation difficult and embarrassing; far more so than in injuries of the shoulder, a joint which can, by its anatomical position, even under adverse circumstances, be kept tolerably immovable, and, consequently, free from many sources of after trouble, with much greater ease than the elbow. Either for this reason, or some other, injuries of the joint of the elbow less frequently do well after gunshot wounds than those of the shoulder. Larrey noticed how often tetanus followed them, and every surgeon is aware of their gravity." "The approval of and growing confidence in this operation, is shown by the fact, that in the Schleswig-Holstein campaign, for simple shattering of the elbow joint by bullets, without other complication, six amputations were performed in 1848, three in 1849, and none in 1850, excisions having taken their place. Of 40 instances of the latter during the years just named, 6 only were fatal. In one case, amputation, on account of gangrene, was subsequently performed, and one was still under treatment. The remaining 32 resulted in a more or less useful arm." "In amputations of the arm, performed during the above campaign, 19 out of 54 were fatal." "In the Crimean war, 22 excisions of the elbow were performed, of which 3 ended fatally; 2 deaths also occurred after secondary amputation. Of 153 arm amputa-

tions, 29 were fatal; of 33 primary disarticulations of the elbow, 28 were fatal, and 24 of 31 secondary disarticulations.

Grouping these cases, we have, excluding the one under treatment, and that in which subsequent amputation was performed, sixty excisions, with eleven unfavorable results, or a mortality of 18.33 per cent., and adding the one excluded above, 208 amputations, with 48 deaths, or a mortality of 23.07 per cent. This gives a percentage of 4.74 in favor of excision." The Crimean war taught that "partial excisions, of which there were a good many cases, did not turn out, on the whole, at all so well as complete ones. They were more tedious, more liable to fail, and less satisfactory when they succeeded, than when the whole articulation was removed." "A single remark may be made with regard to treatment, and that is, that poultices are decidedly prejudicial applications in the class of cases which have just been discussed, adhesive processes being prevented by their use, and suppuration and ulceration being excited. Such is the opinion of Guthrie, Sir Astley Cooper, and of Mr. Hutchinson, in his paper already alluded to. My own observation is confirmatory of this conclusion. Their omission is, however, a matter of difficulty, so agreeable are they to the patient; their long employment should at least be prevented, and their use discontinued as soon as possible."

Second. Excision for ankylosis is noticed after this manner:

"Dr. John Rea Barton, of Philadelphia, in 1827, recommended removal of the ends of the bones of the elbow joint as a means of curing ankylosis, though an operation done by Texter in 1823, may perhaps have anticipated his suggestions. Of late years many surgeons have put in practice this method of treatment." Dr. Hodges then gives the cases of Messrs. Fergusson, Holthouse, Syme, Bickerstith, of Liverpool, and G. Buck, of New York city, and then concludes: "Although success is frequent, still, considering its uncertainties, the operation, it seems to me, can hardly be undertaken with propriety, except in cases where the arm has stiffened either in a straight position, or in one of extreme flexion; or unless some special circumstances in an individual's position authorize an experiment, the results of which may be only a renewed ankylosis." In reference to the third division under consideration, Excision for Disease, the Doctor gives a very full detail, from which I shall quote largely. He writes, "Thirty years ago, in all incurable diseases of the elbow, the necessity of amputation was considered inevitable. Now, no

excision has been so frequently performed as that of this joint, or with such generally successful results, and no capital operation has a more fixed and recognized position in surgery. At Guy's Hospital, for instance, amputation for disease of the elbow is so rare, that in five years but a single instance of it had occurred, though in the same period eight excisions were performed, with one death and one subsequent amputation; in the remainder, a good arm being preserved." "Ulceration of the cartilages and caries of the ends of the bones—'white swelling' in its varying forms—is almost the only affection for which excision of the elbow is ever contemplated. Its frequency in this joint, in the hospital just now mentioned, is as one to four of the hip and knee, which are the most often diseased. In cases suggesting excision, the existence of a certain amount of constitutional vigor, and the failure of patient waiting for a cure by nature, must be ascertained facts, as well as that the disease has reached an incurable state, either from utter want of all rational remedial means, or through their inability to arrest its progress.

That such a point has been attained, the eye and the hand of the surgeon can decide better than words can describe. There is one feature, however, to which Mr. Fergusson calls such special attention that I cannot pass it by. This is, to quote his own words, "an elasticity about the joint which can be appreciated by pressing the ulna against the end of the humerus, as also, by swinging the fore-arm laterally. If there is much mobility and elasticity under such movements, I consider the joint as most seriously involved, and that in all probability, the best treatment will be excision, for, when the above condition is present, I believe all hope of cure for years to come may be set aside."

Within certain limits the extent of the disease is not a hindrance to the performance of the operation. That the roughened and stalactitic state to which the shafts of the bones, in the vicinity of a diseased elbow, are particularly prone, resulting from contiguity to the centre of morbid action, is not an objection to excision, is most satisfactorily answered by the success with which it is performed.

It is a condition very different from caries itself, and the result of a process tending to limit rather than increase the disease. Although sometimes requiring removal, the outgrowth usually disappears when the source of irritation is taken away, just as the thickened and indurated tissues surrounding the joint soften down and are replaced under a healthier action. The

condition of the soft parts is, in fact, a more important point than that just considered ; for if it is such that they can only slowly assume a healthy state, it may lead to a return of the disease of the bones. Few cases, where the disease of the integument persisted after the operation, and the caries reappeared, are mentioned by Dupuytren as terminating finally in amputation, and a similar instance is cited by M. Thore ; within a month of the excision the soft parts had relapsed into a most unhealthy state, and seven or eight months afterward the patient died. Upon one occasion M. Roux thought it necessary to cut the soft parts away largely, on account of their diseased condition, and trust to the slow processes of granulation for their restoration." "The histories of collected cases show that the sources of failure lie chiefly in the patient's general condition and tendencies ; that the cases demanding subsequent amputation are few in proportion to the whole number of operations, and that death rarely occurs from causes connected with the excision itself." He then gives a table of 119 cases, and thus refers to it : "The foregoing table is made up from a great variety of sources, as the references prove. It comprises all the cases, which, with histories attached, have fallen within my range of research (excluding Mr. Symes's series), and the disease in every instance was 'white swelling' in some one of its various phases and stages. Of the 119 cases of which it consists, 80 were males and 38 females, the sex in one case not being mentioned. In only 73 is the side operated upon reported, and of these 48 were of the right and 25 of the left. The age of the oldest patient, of those where it is stated, was 74 years, and of the youngest, 14 weeks ; both of these recovered, the former with a flexible elbow but stiff fingers, the latter with a useful arm." "A fatal termination occurred in 15 cases," and "in 15 cases subsequent amputation was rendered necessary," and he states the causes for those unfavorable results. He proceeds to notice then the successful cases as follows : Of the 89 cases recovering without amputation, 77 regained useful arms. In 8 the operation was followed by ankylosis, the hand and fore arm remaining useful. One case at the end of eight months was unhealed and in a discouraging state ; one at the expiration of 4 months was "unpromising," and one, with a movable elbow, had yet a stiff wrist ; while in still another, the result was an "indifferent one." And finally sums up the results of the operation for disease thus, "the degree of usefulness retained, varies from a condition where only the hand was serviceable, up to a

perfection nearly equal to that of the natural state. Too great mobility sometimes impairs the servicableness of an arm as much as too great rigidity. Such a result appears to have occurred not unfrequently in the experience of M. Roux. Flexion is generally better performed than extension, whilst pronation and supination often remain quite perfect. A frequent test of strength appears to have been the carrying of a pail of water, and this seems often enough to be readily done. One of Moreau's patients ultimately threshed corn and held the plough. A patient of Mr. Key's became a letter-sorter in the post office.

A railway guard, operated on by Mr. Syme, says, he knows no difference in his two arms. A patient of Mr. Cock's, nine months after the operation, boasted that he could make more shoes in a given time than any man in London. In fact, in all successful cases, the ordinary occupations of life are resumed, and patients soon learn to accommodate themselves to the limitation of movements, which follows the operation. The perfect co-ordination of muscular action which characterizes the normal state of things, is almost always somewhat deranged. Flexion, for example, is accomplished in two steps; first the triceps contracts, the forearm is lifted, and a fulcrum obtained; the biceps then acts and produces flexion. These motions Mr. Roberts, who has called attention to them, says still exist in one of his patients, fifteen years after the operation, and are already apparent in another, which is only convalescing; they were also sufficiently distinct in a patient operated on by Dr. J. O. Stone, of New York. It has been alleged that, as a rule, young persons do best after excision of the elbow; there being in the adult a greater tendency towards ankylosis to overcome. This statement is not supported by the cases under consideration.

Dr. Hodge then proceeds to speak of the *operation and after treatment*. He begins in this wise: "The elbow may be excised by a variety of methods, the principal difference between which is in the incisions deemed proper. Perhaps the best is that of Langenbeck, of Berlin, consisting of a single straight incision, carried two inches above and below its extremity. It possesses the merit of simplicity, and of allowing the ready approximation of the edges of the incision without gaping of the wound. It is only objectionable on account of the liability of the skin to tear whenever the soft parts are diseased or stiffened by infiltration, during the extreme flexion necessarily made in exposing the ends of the bones. It is, therefore, most applicable to excisions for

traumatic cause. The addition of an external lateral incision, falling upon the centre of the longitudinal one, obviates the difficulty just named, and converts the operation into that described in the books as Jaeger's or Liston's." "The exposure of the joint should be so conducted that the sheath of the nerve, where it lies in the groove beside the olecranon, shall not be interfered with. The disorganization of the soft parts is sometimes so great, that the position of the nerve can with difficulty be decided upon, and its place only determined after the bones have been partly laid bare; the operation may, however, often be performed so that it is neither exposed nor seen. Although there is a possibility that sensation may be regained, even if the nerve has been divided, this ought never to be done, unless by accident, when prevention is so easy, and a cure so doubtful. In compound fracture of the internal condyle, the nerve is liable to be severed by the accident itself. When the bones are fairly exposed,—and this, owing to the shape of the articulation, is a dissection requiring time, and one of no little difficulty, especially about the inner condyle,—division of the lateral ligaments and conjoined tendons freely opens the interior of the joint.

"In a large proportion of cases only the surface of the articulation is diseased, and that alone need be removed. The extent of the excision, however, should be such that when the parts are brought together, the bones shall neither lock nor the transverse incision gape in bending the arm to a right angle. The insertions of the biceps and brachialis anticus muscles are to be preserved if possible, and it is to be remembered that, in dividing the ulna and radius low down, the interosseous artery is endangered.

"Four inches of bone above and four inches below the joint have several times been removed, and a useful arm left.

"In the excision of no joint for disease have partial operations been so universally condemned as in that of the elbow. Without an exception, all surgeons who have often operated decide against them. Among these may be mentioned Mr. Syme, Mr. Bickersteth, Mr. Erichsen and Mr. Fergusson.

"With regard to the length of treatment necessitated by the operation, it will be found that months or years, or even a whole lifetime, may elapse before the occasional occurrence of small collections of matter in and about the joint will cease; but these rarely interfere with the patient's comfort, or affect the usefulness and strength of the limb."

He concludes the matter of treatment as follows :

"The 'time of treatment' is recorded in 77 of the cases of recovery included in my table. This has reference, not to the time when full usefulness of the limb was restored, but to the period during which the patient required surgical care, and at the end of which he was able to commence the use of his arm. This varies from four weeks to two years, and averages $175\frac{3}{11}$ days, or $5\frac{5}{6}$ months. According to Sansom, 110 days is the average duration of treatment after amputation of the arm."

The subject of *dissections* of the elbow, after the successful operation, is next considered. I again quote from this elaborate monograph. He states that: "In 1855, Mr. Syme, with all his experience, had seen but two dissections of elbow-joints after the lapse of any length of time from the excision. In one the operation had been performed ten months; in the other, which was followed by a most successful result, nine years had elapsed. In the first, 'the place of the extremities of the bones was occupied by a mass of strong fibrous tissue, closely resembling ligament, which allowed of motions in all directions. The triceps was attached to the posterior surface of this newly-formed ligament, and, through means of it to the extremity of the ulna.' In the second case, the ends of the bones were adapted to each other in such a way as to form a hinge-joint. There had been an extensive growth of bone and ligament, and the osseous surfaces of the new articulation were covered with a fibro-cartilage, or smoothed over by a porcellaneous deposit, and lubricated by a sort of synovia: the ulna and radius were received between two osseous processes, growing downwards from the end of the humerus.

"From the dissections collated by Albrecht Wagner, it appears that complete pseudarthrosis was found in but one case; in this the trochlea of the humerus appeared as perfect as if none of it had been taken away. In all the others, the bones were either rounded, and united by a fibrous medium, or more or less completely ankylosed from muscular adhesions, the shortness or density of the uniting fibrous tissue, the too close approximation of the bones from muscular contractions, or the formation of a superabundant callus. In no case had a new articular capsule been formed. The muscles had fixed themselves to the processes and irregularities of the bones, which had been gradually developed, and were generally atrophied, or more or less fatty. The nerves were softened, enlarged, and also fatty, and to this

degeneration he thinks the loss of power in the limbs may be attributable.

"The regeneration of the removed bone, by preserving the periosteum, is a question still in abeyance, and requires the confirmation of dissections not yet made. M. Verneuil, well known as a careful observer, presented several cases of excision of the elbow-joint to the French Academy in 1859, to show that, by dissecting off and preserving whatever of periosteum the disease has left, the shortening ordinarily ensuing might be obviated. Thus, in one case where four inches of bone were removed and this precaution taken, the shortening was but two inches. In another instance a cylinder of periosteum was preserved with satisfactory results."

CONCLUSIONS.

The general conclusions drawn by Dr. Hodges in reference to the operation of excision of the elbow joint, I will now give in full, and acknowledge most cheerfully the great service he has rendered to the profession by his careful and learned exposition of this great improvement in the surgical art. His conclusions finally are these:

First.—That although partial excision had been practiced upon several occasions, and by Mr. Wainman in England, so early as 1758-59, the first complete excision of the elbow joint was performed by the elder Moreau in 1794.

Second.—That excision for traumatic cause appears to be a safer operation than amputation, and ordinarily preserves a limb of very considerable usefulness. This is especially true of those occurring in civil practice.

Third.—That excision for ankylosis is only adapted to cases where the arm has stiffened in a straight position, or in one of extreme flexion, unless special circumstances authorize the risk of an operation frequently ending in no improvement of the ankylosis.

Fourth.—That in excision for disease death occurs once in 7 14 15 cases; and that the operation fails of its primary intention—the riddance of the disease with the preservation of a useful arm—by death, amputation or other cause, once in 3 17-34 cases. Patients recovering are usually able to resume their ordinary occupations.

Fifth.—That partial excision, either for traumatic or organic lesions, is a frequent cause of unfavorable results."

